the west end of Emerald Isle. Engineering studies were undertaken to evaluate the size characteristics of the existing bar channel to determine the size of the new channel needed to capture the majority of the flow through the inlet. The hydrodynamic model was performed for the existing conditions of the inlet to establish base tidal exchange and circulation conditions within the inlet and connecting channels. The proposed channel design was modeled to develop flow and circulation patterns for comparison with the base conditions and to assess the need for, and impact of, closure of the existing channel next to The Pointe.

4. GEOMORPHIC ANALYSIS SUMMARY: Contemporary changes in the inlet and along the adjacent oceanfront shorelines were determined through analysis of a series of representative historic aerial photographs dating from 1973 through 2001. Twenty-five sets of photographs were initially examined for trends; and on the basis of these evaluations, thirteen sets of aerial photographs covering a large spatial and temporal scale (1973–2001) of Bogue Inlet, Bogue Banks, Hammocks Beach State Island (Bear Park) and neighboring marshes (Dudley Island) were analyzed. An 18,500-foot long baseline was established landward of all digitized shorelines and thirty-seven perpendicular transect lines, at 500-foot spacing were used to measure and calculate the various shoreline positions and relative changes. A second baseline was established from a stable reference position on Bogue Banks extending across the inlet to Hammocks Beach. The inlet baseline was utilized for the purpose of measuring and calculating ebb channel midpoint changes, inlet width along the baseline, and shoulder changes associated with ebb channel migration. The orientation of the ebb channel relative to the baseline was also recorded.

4.1 Ebb Channel Orientation. Over the past three decades, the orientation and position of main ebb channel has changed repeatedly, ranging from 143^{o} in February 1984 to 185^{o} in March 1999. An orientation of approximately 160^{o} is perpendicular to the general alignment of the shorelines on the adjacent islands. The movement and orientation of the outer segment of the main ebb channel, coupled with the migration of the landward segments of the channel have dictated much of the contemporary and historic shoreline change patterns along both shoulders and oceanfront shorelines.

4.2 Changes in Inlet Morphology. During the past three decades, the morphology of the inlet has changed substantially (Figures 4.1 to 4.3). Several distinct periods of change can be recognized, each with unique migration trends and morphologic characteristics. The initial phase covers the period between 1973 and 1981 when the ebb channel was moving to the west, subsequent to the shore-normal reorientation and formation of a single ebb channel in 1975. The net westward movement of the ebb channel was 1,895 feet during this initial phase of change. The second stage of inlet evolution occurred between 1981 and 1988. During this time, the single well–defined ebb channel migrated to the east approximately 830 feet (rate = 119 feet/year) and a wide marginal flood channel developed on the Bear Island shoulder. The expansion of the flood channel promoted the development of the swash platform and the mid inlet shoal. For the period from February 1984 to September 2001, the midpoint of the channel moved to the east at a rather steady rate of 93.3 feet/year. Little significant change has